

In re SANDERSON .. Appln. No. 09/486,360

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Kindly add new claims 41-47 as set forth on the attached sheets.

REMARKS

Reconsideration and allowance are respectfully requested in view of the following.

Upon entry of this Amendment, claims 1-13 and 41-47 will be pending in the application, with claims 14-40 having been cancelled without prejudice or disclaimer to their reintroduction in a future continuation or divisional application.

Applicants respectfully submit that the amendments to the claims and the subject matter of new claims 14-47 are fully supported by the original disclosure, and that no new matter would be introduced by entry thereof.

Amendments to claims 1, 3, 4, 6, and 7 have been presented to clarify Applicants' invention further. In particular, claims 1 and 4 have been amended to switch their recited crystalline temperature ranges for the A blocks. The crystalline temperature range of claim 1 is now broader than the range recited in claim 4. This amendment is supported in the specification at, *inter alia*, page 6, lines 9-11. Claim 1 has also been amended to delete the expression "at temperatures" in order to clarify the claims further by removing redundant language, which was apparently confusing to the

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Examiner. The amendment to claim 8 is supported in the specification at, *inter alia*, at page 12, lines 27-28. The amendments to claims 6 and 7 address grammatical issues and ensure proper antecedent basis.

New claims 41 and 42 are supported in the specification at, *inter alia*, page 6, lines 15-17.

New claim 43 is based on original claim 1, and finds further support in the specification at, *inter alia*, page 7, lines 10-18.

New claims 44-47 are based on claim 2, 3, 6, and 7, respectively.

Accordingly, approval and entry of the attached claim amendments and new claims are respectfully requested.

Double Patenting Rejection

Claims 1-13 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-11 of co-pending application 09/496,440.

Given the provisional nature of this rejection and the possibility of further claim amendments to this and the co-pending application, it is respectfully requested that this rejection be held in abeyance until the claims of the co-pending application are found allowable.

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Section 103(a)

Filed herewith is a Declaration signed by each of the inventors indicating that the inventions of this and co-pending application 09/436,440 were commonly owned at the time the invention of this application was made.

Section 112, First and Second Paragraphs

Claims 1-13 have been rejected under 35 U.S.C. § 112, second paragraph, on the ground that the language "about" is indefinite.

This rejection is traversed.

This issue has been addressed by the Board of Appeals, which has held that:

"[t]he descriptive word "about" is not indefinite as argued by the Examiner [but] . . . rather the term is clear but flexible and is deemed to be similar in meaning to terms such as "approximately" or "nearly".

Ex parte Eastwood, 163 USPQ 316, 317 (P.O.B.A. 1969).

Even though the term "about" may encompass values slightly above or below a given temperature, this does not render the literal recitation of "above about" or "below about" indefinite. The meaning of the word "about" and its acceptance under relevant case law are not changed by the terms "above" or "below".

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Claims 1-19 have been rejected under 35 U.S.C. § 112, first paragraph on the ground that "substantially solid" has not been defined.

It is respectfully submitted that this rejection is misplaced, since "substantially" is clearly meant to infer the elastomeric nature of the material. Nonetheless, in order to advance prosecution, and because the term "substantially" is redundant in view of the recitation of the term "elastomer" already recited in the claims, Applicants have amended the claims to delete the term "substantially." It is believed that the scope and meaning of the claims is not affected by this amendment, since a "substantially solid" elastomer is, in effect, a solid. This amendment is made merely to put the claim in better form and not for any reason affecting patentability.

Claims 2 and 3 have been rejected under 35 U.S.C. § 112, first paragraph, on the ground that the specification is allegedly enabling for 2,4-toluene diisocyanate, but not all species of "toluene diisocyanate." In response, claim 3 has been amended to overcome this ground of rejection. This amendment is being made to advance prosecution, and not as a concession to the rejection or for reasons affecting patentability. Applicants make this amendment without prejudice or waiver and reserve the right to pursue patentability of claims 2 and 3 as originally presented in a separate continuation or divisional application.

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Section 103(a) Rejection of Claims 1-13

Claims 1-13 have been rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 4,806,613 to Wardle in view of Biddle and Hinshaw.

Applicants respectfully traverse the Section 103(a) rejection.

As the Examiner acknowledges, the Wardle '613 patent is silent regarding the use of an oxirane-based soft segment.

A soft block derived from an oxirane derivative will have a secondary hydroxyl group. The secondary group is much less reactive than primary hydroxyl groups of oxetane blocks. As a result, the oxirane blocks are difficult to react by the Wardle '613 patent synthesis technique.

The difficulties involved with chain-linking a secondary hydroxyl group of an oxirane would have been known to those of ordinary skill in the art, as evidence by the Hinshaw '603 patent. Column 1, lines 57-61 of the Hinshaw '603 patent are reproduced below:

Also, because the terminal hydroxyl groups of GAP are secondary hydroxyl groups, curing with polyfunctional isocyanates is less efficient than is desirable for achieving good mechanical characteristics of the cured elastomer.

To achieve good curing, the Hinshaw '603 patent discloses end-capping the non-primary hydroxyl group. The end-capping compound has an hydroxyl-reactive group at one end and a group at the other end which is

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removable to provide a primary, unhindered hydroxyl group. The hydroxy-terminated polymers are then chain-extended with a diisocyanate.

The end-capping compound of the Hinshaw '603 patent differs from the diisocyanate end-capping compound of the claimed invention. A combination of the Hinshaw '603 patent with Wardle and Biddle would, therefore, not have resulted in the claimed invention.

For all of these reasons, the Section 103(a) rejection is misplaced, and withdrawal of the same is respectfully requested.

The claims, as presented herein, are submitted to be in condition for allowance and an early Notice to that effect is requested.

If, after reviewing the above, the Examiner believes any issues remain unresolved, the favor of an Examiner interview is requested and the Examiner is requested to contact the undersigned, by telephone, to schedule same.

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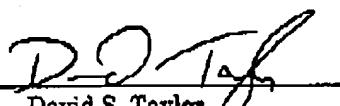
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It is Applicants' understanding that there is no fee due in connection with the filing of this Amendment. If there are any other fees due in connection with the filing of this application or otherwise relating to this application, please charge the fees to our Deposit Account No. 501324, under Order No. 1082-370.

Respectfully submitted,

Sullivan Law Group

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AMENDED CLAIMS:

1. (Once amended) An energetic thermoplastic elastomer having A blocks and B blocks and being present in a [substantially] solid state suitable for use as a binder for at least one of a propellant, explosive, and gasifier, the energetic thermoplastic elastomer being formed from a composition comprising, as constituents:

A blocks terminated with isocyanate-reactive groups derived from monomers comprising one or more oxetane derivatives, the A blocks being crystalline [at temperatures] below about [75°C] 60°C;

B blocks terminated with isocyanate-reactive groups derived from monomers comprising at least one member selected from the group consisting of oxirane and derivatives thereof, the B [block(s)] blocks being amorphous [at temperatures] above about -20°C; and

linking groups derived from at least one diisocyanate and at least one linking compound comprising two functional groups which are reactive with isocyanate moieties of the diisocyanate.

3. (Once amended) An energetic thermoplastic elastomer as defined in claim 2, wherein the diisocyanate comprises [toluene diisocyanate] 2,4-toluene diisocyanate.

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4. (Once amended) An energetic thermoplastic elastomer as defined in claim 1, wherein the A blocks are crystalline [at temperatures] below about [60°C] 75°C.

6. (Once amended) An energetic thermoplastic elastomer as defined in claim 1, wherein the B [block comprises] blocks comprise difunctional glycidyl azide polymer.

7. (Once amended) An energetic thermoplastic elastomer as defined in claim 1, wherein the B [block comprises] blocks comprise poly(glycidyl nitrate).

41. (New) A thermoplastic elastomer as defined in claim 1, wherein the A blocks have a melting point between about 60°C and about 120°C.

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42. (New) A thermoplastic elastomer as defined in claim 4, wherein the A blocks have a melting point between about 75°C and about 100°C.

43. (New) An energetic thermoplastic elastomer having A blocks and B blocks and being present in a solid state suitable for use as a binder for at least one of a propellant, explosive, and gasifier, the energetic thermoplastic elastomer being formulated from a composition comprising, as constituents:

A blocks terminated with isocyanate-reactive groups derived from monomers comprising at least one member selected from the group consisting of 3,3-(bis(ethoxymethyl)oxetane, 3,3-bis(chloromethyl)oxetane, 3,3-bis(methoxymethyl)oxetane, 3,3-bis(fluoromethyl)oxetane, 3,3-bis(acetoxymethyl)oxetane, 3,3-bis(hydroxymethyl)oxetane, 3,3-bis(methoxyethoxymethyl)oxetane, 3,3-bis(iodomethyl)oxetane, 3,3-bis(nitratomethyl)oxetane), 3,3-bis(methylnitraminomethyl)oxetane, and 3,3-bis(azidomethyl)oxetane);

B blocks terminated with isocyanate-reactive groups and comprising at least one member selected from the group consisting of glycidyl azide polymer and poly(glycidyl nitrate); and

linking groups derived from at least one diisocyanate and at least one

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linking compound comprising two functional groups which are reactive with isocyanate moieties of the diisocyanate.

44. (New) An energetic thermoplastic elastomer as defined in claim 43, wherein:

the diisocyanate contains a first isocyanate moiety which is at least five times more reactive with the terminal groups of the blocks than a second isocyanate moiety thereof, whereby the more reactive first isocyanate moiety is capable of reacting with and end-capping the terminal groups of the blocks, leaving the less reactive second isocyanate moiety free and unreacted; and

the linking compound has two isocyanate-reactive groups which are sufficiently sterically unhindered to be reactive with the free and unreacted second isocyanate moieties of the end-capped blocks.

45. (New) An energetic thermoplastic elastomer as defined in claim 44, wherein the diisocyanate comprises 2,4-toluene diisocyanate.

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46. (New) An energetic thermoplastic elastomer as defined in claim
43, wherein the B blocks comprise difunctional glycidyl azide polymer.

47. (New) An energetic thermoplastic elastomer as defined in claim
43, wherein the B blocks comprise poly(glycidyl nitrate).

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AMENDED CLAIMS:

1. (Once amended) An energetic thermoplastic elastomer having A blocks and B blocks and being present in a solid state suitable for use as a binder for at least one of a propellant, explosive, and gasifier, the energetic thermoplastic elastomer being formed from a composition comprising, as constituents:

A blocks terminated with isocyanate-reactive groups derived from monomers comprising one or more oxetane derivatives, the A blocks being crystalline below about 60°C;

B blocks terminated with isocyanate-reactive groups derived from monomers comprising at least one member selected from the group consisting of oxirane and derivatives thereof, the B blocks being amorphous above about -20°C; and

linking groups derived from at least one diisocyanate and at least one linking compound comprising two functional groups which are reactive with isocyanate moieties of the diisocyanate.

3. (Once amended) An energetic thermoplastic elastomer as defined in claim 2, wherein the diisocyanate comprises 2,4-toluene diisocyanate.

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A²
Amend

4. (Once amended) An energetic thermoplastic elastomer as

defined in claim 1, wherein the A blocks are crystalline below about 75°C.

A³

6. (Once amended) An energetic thermoplastic elastomer as

defined in claim 1, wherein the B blocks comprise difunctional glycidyl azide polymer.

A³

7. (Once amended) An energetic thermoplastic elastomer as

defined in claim 1, wherein the B blocks comprise poly(glycidyl nitrate).

A⁴
Amend

41. (New) A thermoplastic elastomer as defined in claim 1, wherein

the A blocks have a melting point between about 60°C and about 120°C.

A⁴
Amend

42. (New) A thermoplastic elastomer as defined in claim 4, wherein

the A blocks have a melting point between about 75°C and about 100°C.

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48. (New) An energetic thermoplastic elastomer having A blocks and B blocks and being present in a solid state suitable for use as a binder for at least one of a propellant, explosive, and gasifier, the energetic thermoplastic elastomer being formulated from a composition comprising, as constituents:

A blocks terminated with isocyanate-reactive groups derived from monomers comprising at least one member selected from the group consisting of 3,3-(bis(ethoxymethyl)oxetane, 3,3-bis(chloromethyl)oxetane, 3,3-bis(methoxymethyl)oxetane, 3,3-bis(fluoromethyl)oxetane), 3,3-bis(acetoxymethyl)oxetane, 3,3-bis(hydroxymethyl)oxetane, 3,3-bis(methoxyethoxymethyl)oxetane, 3,3-bis(iodomethyl)oxetane, 3,3-bis(nitratomethyl)oxetane, 3,3-bis(methylnitraminomethyl)oxetane, and 3,3-bis(azidomethyl)oxetane;

B blocks terminated with isocyanate-reactive groups and comprising at least one member selected from the group consisting of glycidyl azide polymer and poly(glycidyl nitrate); and

linking groups derived from at least one diisocyanate and at least one linking compound comprising two functional groups which are reactive with isocyanate moieties of the diisocyanate.

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44. (New) An energetic thermoplastic elastomer as defined in claim
43, wherein:

the diisocyanate contains a first isocyanate moiety which is at least five times more reactive with the terminal groups of the blocks than a second isocyanate moiety thereof, whereby the more reactive first isocyanate moiety is capable of reacting with and end-capping the terminal groups of the blocks, leaving the less reactive second isocyanate moiety free and unreacted; and

the linking compound has two isocyanate-reactive groups which are sufficiently sterically unhindered to be reactive with the free and unreacted second isocyanate moieties of the end-capped blocks.



45. (New) An energetic thermoplastic elastomer as defined in claim
44, wherein the diisocyanate comprises 2,4-toluene diisocyanate.

46. (New) An energetic thermoplastic elastomer as defined in claim
43, wherein the B blocks comprise difunctional glycidyl azide polymer.

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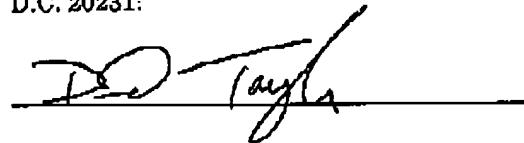
47. (New) An energetic thermoplastic elastomer as defined in claim
48, wherein the B blocks comprise poly(glycidyl nitrate).

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CERTIFICATE OF EXPRESS MAILINGExpress Mail Label No. EL800112525USDate of Deposit June 5, 2001

I hereby certify that this Amendment is being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed, Assistant Commissioner for Patents, U.S. Patent and Trademark Office, Washington, D.C. 20231:



DECLARATION

1. We, Andrew J. Sanderson, Wayne W. Edwards, Louis F. Cannizzo, and Robert B. Wardle, do hereby declare that we are the joint inventors of the inventions claimed in U.S. Patent Application assigned Serial No. 09/486,360, filed November 9, 1999 and entitled "Synthesis of Energetic Thermoplastic Elastomers Containing Both Polyoxirane and Polyoxetane Blocks." We declare that we jointly made this invention while employed at Cordant Technologies Inc. (or its predecessor in name, Thiokol Corporation). We further declare that the work performed by us in making the invention was within the scope of our employment. We also declare that each of us was under a duty to assign all rights, title, and interest in the invention to Cordant Technologies Inc. (or its predecessor in name, Thiokol Corporation) at the time the invention was made.

2. We, Andrew J. Sanderson and Wayne W. Edwards, do hereby declare that we are the joint inventors of the inventions claimed in U.S. Patent Application assigned Serial No. 09/486,440, filed November 9, 1999 and entitled "Synthesis of Energetic Thermoplastic Elastomers Containing Oligomeric Urethane Linkages." We declare that we jointly made this invention while employed at Cordant Technologies Inc. (or its predecessor in name, Thiokol Corporation). We further declare that the work performed by us in making the invention was within the scope of our employment. We also declare that each of us was under a duty to assign all rights, title, and interest in the invention to Cordant Technologies Inc. (or its predecessor in name, Thiokol Corporation) at the time the invention was made.

3. We hereby declare that all statements made herein of our knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the

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knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the present applications or any patents issued thereon.



Andrew J. Sanderson

May 01 2001



Wayne W. Edwards

May 01 2001



Louis F. Cannizzo

May 02 2001



Robert B. Wardle

May 02 2001